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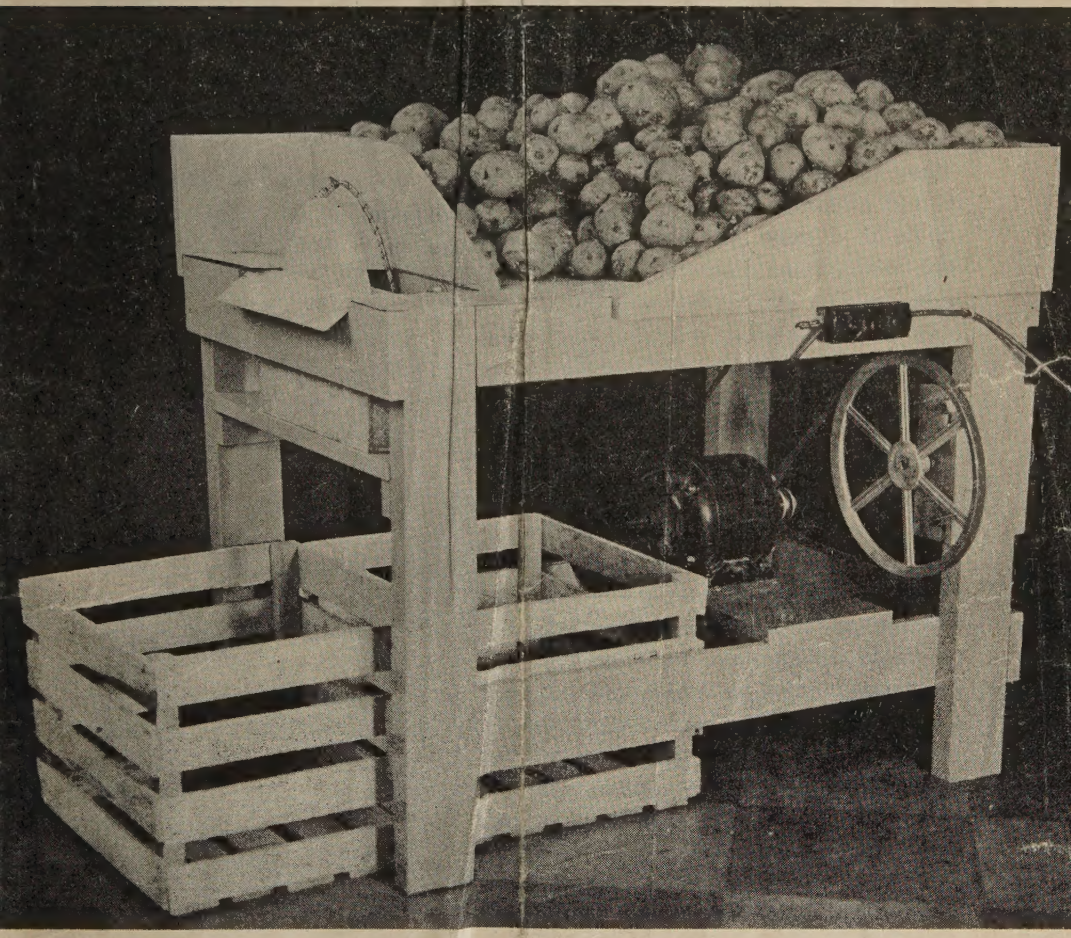

A ROTARY CUTTING KNIFE TO REDUCE THE SPREAD OF POTATO RING ROT IN INFECTED SEED LOTS

Cornell Extension Bulletin

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A ROTARY CUTTING KNIFE TO CONTROL THE SPREAD OF POTATO RING ROT

L. M. Roehl and L. C. Knorr

Best control of potato ring rot is obtained by the following three-point program: (1) disposal of all potatoes on the farm, (2) disinfestation of potato equipment and premises, and (3) procurement of new seed free of the disease. Further details and methods are given in Cornell Extension Bulletin 620, *Potato Ring Rot.*

Under some circumstances, however, such a control program is not always feasible. For example, a source of ring-rot-free seed may not be available at planting time, or a grower may not be in a financial position to buy an entirely new stock of healthy seed. He will, therefore, want to do whatever he can with the infected stock on hand. It is for such emergencies that a rotary cutting knife recommends itself. Savings effected by this machine vary with the extent of ring rot in the seed, with the acreage planted, with the price of potatoes, and with other conditions. The machine ought, however, to pay for itself through ring-rot control on as few as one or two acres in a single season. The cost can be further reduced if one machine is used by a number of growers in a community or if cutting is done on a custom basis. The cost of materials need not exceed $20.

Ring rot is a contagious potato disease that is spread mainly on the cutting knife. A knife that has passed through a ring-rot diseased potato may infect as many as the next 24 healthy tubers. Any arrangement whereby the ring-rot bacteria on the knife are killed before the next potato is cut reduces greatly the spread and loss from this disease. The rotary cutting knife accomplishes this purpose quickly and effectively. Other knife-transmitted diseases, such as spindle tuber, may also be controlled.

Tests of the knife's ability to control ring rot were conducted in 1943 and 1944, and as many as 49 bushels an acre were gained through its use in one experiment — statistically a highly significant difference. In addition, the rotary knife does not injure seed pieces as do various seed dips that have been suggested from time to time for ring-rot control.

In principle, the circular blade of the cutting machine rotates by a motor in a tank of boiling water. Bacteria on the blade are killed at the temperature maintained by boiling water, and in this way a continuously disinfested cutting surface is presented for each succeeding cut.

The accompanying plans suggest one way to build such a rotary knife. Simplicity and economy of design should enable a grower to construct the machine with tools and parts commonly found around the farm or obtainable locally. For large-scale cutting, the table may be extended and more knives and tanks inserted, one for each cutter.

In operation, the cutter sits on a potato crate, or on some other seat of

suitable height, in front of the knife. A tuber from the hopper at his right is taken in each hand and thrust through the turning circular knife the same as if the knife were of the stationary upright type. When a potato, two seed pieces in size, is pushed through the knife, the resulting two halves are released at the moment of separation. The seed pieces fall down an incline on either side of the knife and come to rest in the crates below. There is no lost motion in returning the hands to drop the seed pieces. Larger tubers require the return only of the part to be cut further. Users of this machine claim that with a little experience the rotary knife cuts seed faster than does the conventional hand or stationary cutting knife.

If one prefers, a slight modification may be made in the design to stop the knife from turning while the potato is being cut. The V-belt running from the shaft pulley to the countershaft pulley can be replaced by a round belt of the sewing-machine type. This then can be loosely adjusted so that the belt will slip in the pulley when a potato is held against the knife. In this way the effect and safety of a stationary knife can be obtained.

Material Required

1 piece, 2″ x 4″ x 14′ 0″
1 piece, 1″ x 4″ x 12′ 0″
1 piece, 1″ x 4″ x 8′ 0″
1 piece, 2″ x 2″ x 6′ 0″
1 piece, 1″ x 8″ x 12′ 0″ for motor platform and box at top
1 piece, 1″ x 3″ x 16″ hardwood, for countershaft blocks
1—pound 6-penny box or common nails
2—¼″ x 6″ machine bolts with washers for countershaft blocks
1 piece, ½″ x 12″ cold-rolled shafting or mild steel for countershaft
1 piece, ½″ x 39½″ cold-rolled shafting or mild steel for shaft
2—½-inch set collars
1—3-inch pulley for ½-inch V belt
1—12-inch pulley for ½-inch V belt
1—6-inch pulley for ½-inch V belt
1—½″ x 48″ V belt from motor to countershaft
1—½″ x 38″ V belt from countershaft to main shaft
1—¼-horsepower motor with 1½-inch, ½-inch, V pulley
1—surface tumbler switch
1—immersion-type electric heater, 500-watt
1 piece, 16-gauge sheet metal 14½″ x 24½″ for tank
1 piece, 16-gauge sheet metal 24″ x 36″ for table top
1 piece, 16-gauge sheet metal 2½″ x 12″ for table top at left side of disk
1 piece, 20-gauge sheet metal 10″ diameter for disk for cutter
1 piece, 16-gauge sheet metal 4″ diameter for disk for washer
1 quart, paint

Directions

The frame may be built of any sound lumber at hand. The essential point in its construction is that the frame be assembled to allow the shaft to run freely.

Two hardwood pieces are made as in the detailed drawing *A* (figure 6) to hold the countershaft. They are bolted to the leg of the frame as shown at *B* (figure 1). Provision is thus made for tightening the upper belt. The motor belt is kept tight by use of the slots in the motor base. If the motor at hand does not have a slotted base, slots may be made in the board on which the motor rests.

The shelf on which the tank is set rests on a ¾″ x 2″ x 3¾″ block at each end. The blocks are nailed to the legs at 8 inches from the top of the frame. The tank (figure 3) is placed from below the cutting disk, and the shelf is slid under it unattached.

The 10-inch cutting disk is made of 20-gauge galvanized sheet metal. It is suggested that it be obtained and cut at a tin shop to assure its being perfectly round. It may be sharpened with a file.

To assemble the cutting disk and shaft shown at *C* (figure 5), two ½-inch set collars and a 4-inch sheet-metal washer are used. A ½-inch hole

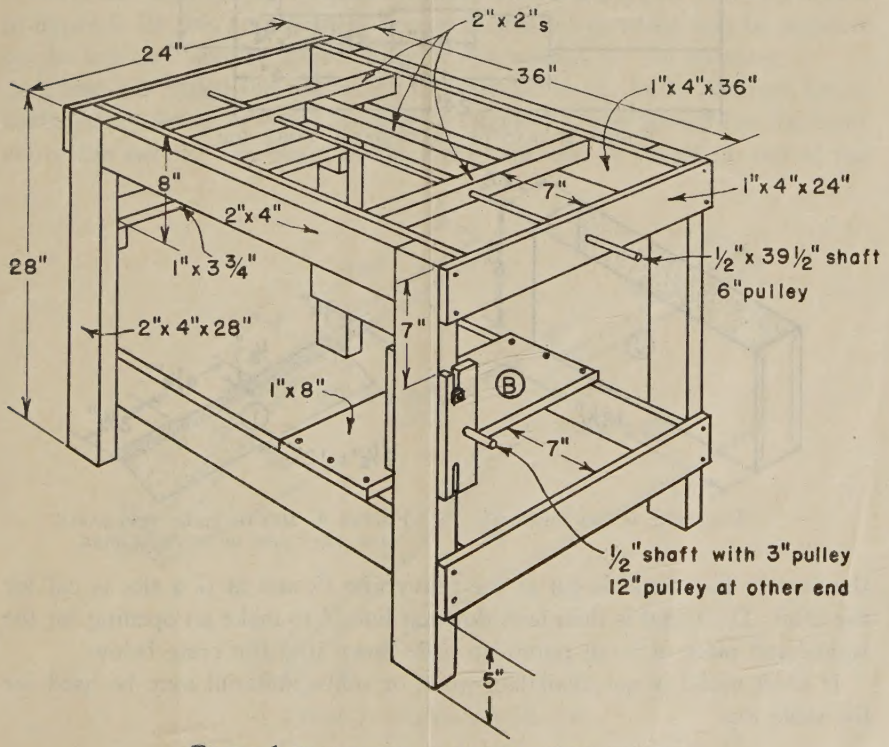

Figure 1. Framework of rotary cutting knife

is drilled in the 4-inch washer at center and the set collar sweat or welded to it. The set collar and washer are then attached to the disk cutter with four light, tinners' rivets. The 4-inch piece stiffens the disk and aids in making it run true. The collars fit against the end cross braces and prevent horizontal movement of the shaft.

For the top of the table a piece of sheet metal is cut to the dimensions shown in *D* (figure 2). In it a rectangular hole *E* is cut 1½" x 2" to insert

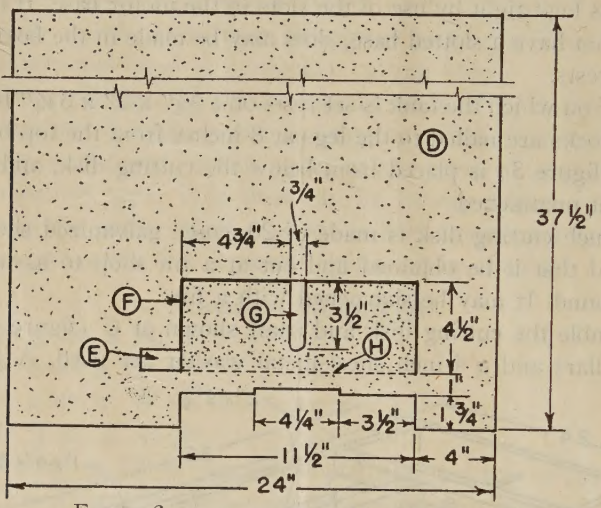

FIGURE 2. PLAN OF SHEET-METAL TABLE TOP

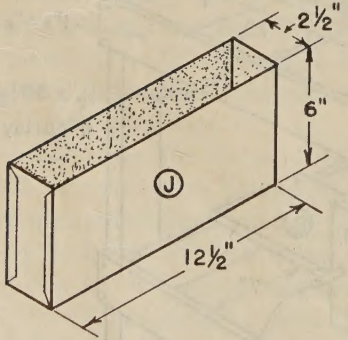

FIGURE 3. WATER TANK

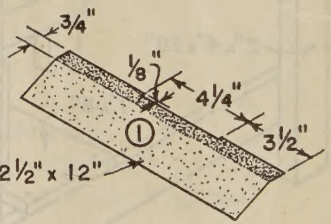

FIGURE 4. METAL PIECE FOR TABLE TOP, LEFT SIDE OF CUTTING DISK

the heater. The metal is cut at the heavy line *F*, and at *G* a slot is cut for the shaft. The metal is then bent down at line *H* to make an opening for the right-hand piece of a cut potato to slide down into the crate below.

If sheet metal is not available, wood or other material may be used for the table top.

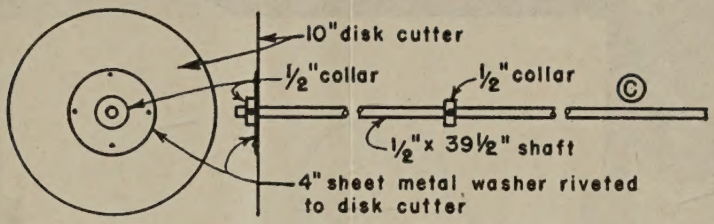

Figure 5. Shaft-and-disk cutter assembly

A piece of sheet metal 2½″ x 12″ is cut and bent as in detail drawing *I* (figure 4) and fastened to the top edge of the left-end top cross brace with two round-head screws at the left of the cutting disk as shown in figure 8.

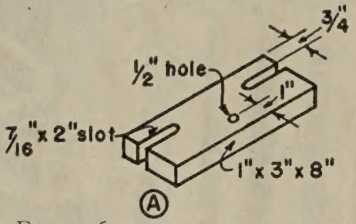

Figure 6. Countershaft block

A sheet-metal tank is made as shown in *J* (figure 3), 2½″ x 6″ x 12½″. This is placed in position from beneath the cutting disk and the shelf slid in place below to support it.

An 8-inch board is used to make the side boards of the box on top as shown in figure 8. By this arrangement several bushels of potatoes may be dumped on the top and handily drawn down where wanted by the operator.

A board is nailed the full length of the table at the back. Another board is shaped as shown in detail drawing *K* (figure 7), and fastened to the front above the switch. The board at the right-hand end is placed on top of the

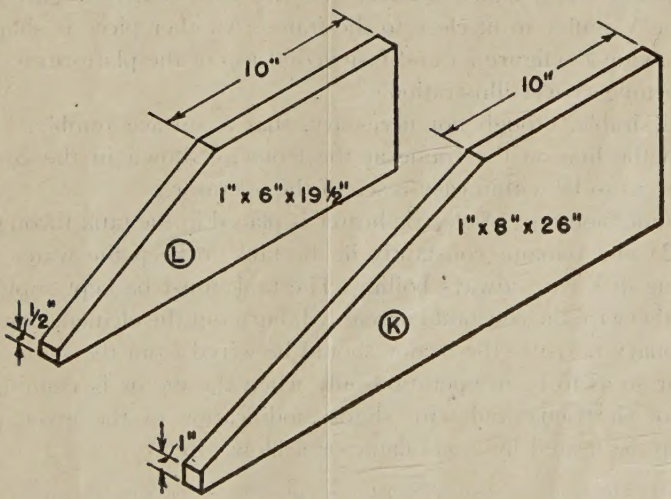

Figure 7. Side boards for box

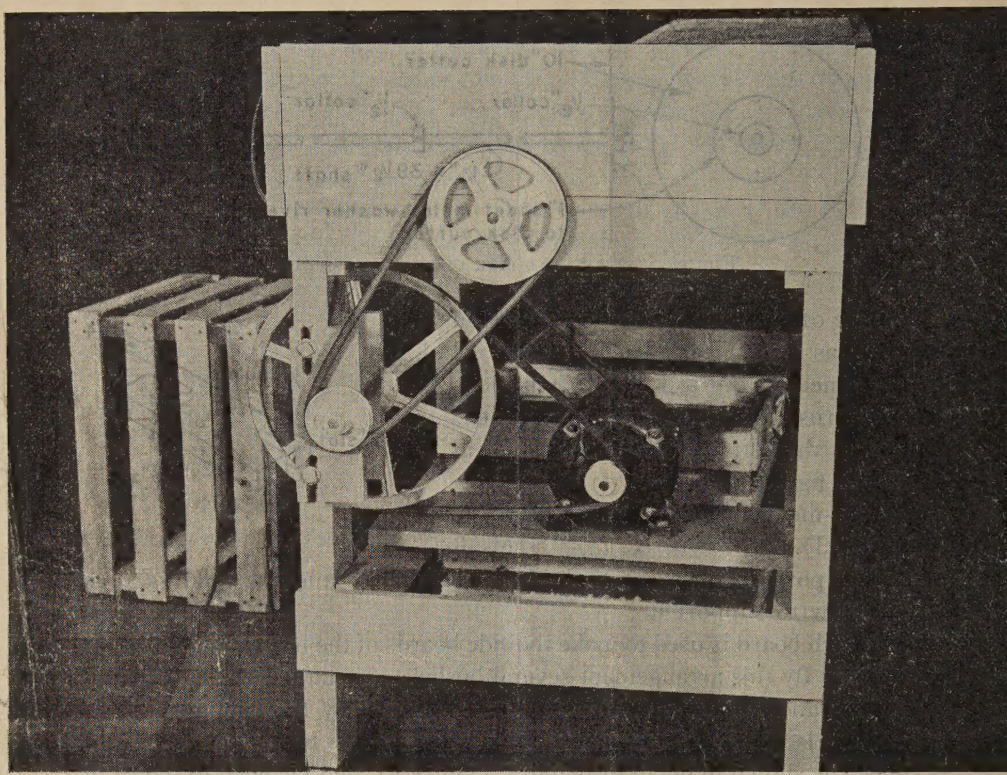

FIGURE 8. RIGHT SIDE OF ROTARY CUTTING KNIFE, SHOWING DRIVE ASSEMBLY

end cross brace and nailed between the two side boards (figure 8). This allows the V pulley to fit close to the frame. Another piece is shaped as in detail drawing *L* (figure 7) and fastened at top of the platform to the right of the opening (cover illustration).

It is desirable, though not necessary, that a surface tumbler switch be placed in the line on the frame at the front as shown in the cover illustration, so as to be within easy reach of the operator.

The immersion type of electric heater is placed in the tank through hole *E* (figure 2) and remains constantly in the tank to keep the water in which the cutting disk runs always boiling. The tank must be kept supplied with water; otherwise the constant current will burn out the element. As a further precautionary measure the heater should be wired from the same switch as the motor so as to be in operation only when the motor is running. In the absence of electricity and with slight modification of the given plan, the water may be heated by a gas flame or a blow torch.

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